# Optimization of metal working fluids treatment using calcium chloride by response surface methodology

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## Abstract

**Background:** Extensive use of metal working fluids degrades their chemical composition. They should be treated using a safe method. Chemical coagulation-flocculation process is one the treatment methods.

**Objective:** The aim of this study was to optimize the coagulation-flocculation process using calcium chloride in metal working fluids treatment.

**Methods:** This laboratory based study was performed in School of Health affiliated to Qazvin University of Medical Sciences in 2014. Using calcium chloride and a six-compartment jar, the efficiency of coagulation-flocculation process was assessed for removal of chemical oxygen demand (COD) and turbidity and amount of released oil. Central composite design (CCD) and response surface methodology (RSM) were applied to optimize the treatment operation parameters (pH and dosage of coagulant). Quadratic models were developed for calculation of the three responses (COD, turbidity, and released oil).

**Findings:** The optimum condition for coagulation-flocculation process was seen after treatment with 4.2 g/L calcium chloride at pH 3.71 in which COD and turbidity removal efficiency were 93% and 96.9%, respectively and the amount of released oil was 31.8 ml. The level of desirability was 91.2%. The values of laboratory study were in good agreement with the values predicted by the model.

**Conclusion:** Metal working fluids treatment with calcium chloride was efficient in the removal of pollution parameters. Dosage of calcium chloride was similar to the conventional coagulants such as Alum, but its efficiency was higher.

**Keywords:** Treatment, Metal Working Fluid, Flocculation, Calcium Chloride, Response Surface Methodology

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